

CLAIMS

1. A polypeptide F' that induces an immune response
5 against the hepatitis C virus, characterized in
that it consists of 99 amino acids located between
positions 43 and 141 of the hepatitis C virus
polyprotein.

2. The polypeptide F' as claimed in claim 1,
10 characterized in that it has the sequence SEQ ID
No.1 below:

15 X₁WVCX₂X₃X₄X₅RLPSGX₆NX₇X₈X₉X₁₀X₁₁X₁₂LX₁₃X₁₄RX₁₅X₁₆X₁₇PRX₁₈G
X₁₉GX₂₀SX₂₁GX₂₂X₂₃GX₂₄SX₂₅X₂₆X₂₇RX₂₈X₂₉X₃₀GX₃₁DGSCX₃₂PX₃₃X₃₄
X₃₅GLX₃₆GAX₃₇X₃₈TPX₃₉X₄₀GX₄₁X₄₂X₄₃WVX₄₄SSX₄₅X₄₆X₄₇X₄₈X₄₉X₅₀
X₅₁PX₅₂SWGX₅₃X₅₄RX₅₅SX₅₆,

in which

20 X₁ is G, D, E, V or S, X₂ is A or V, X₃ is R, H or
Q, X₄ is L, R, P, S or G, X₅ is G or E, X₆ is R, L
or H, X₇ is L or P, X₈ is V, E or A, X₉ is E, V, D
or G, X₁₀ is G or D, X₁₁ is D or V, X₁₂ is N or S,
X₁₃ is S or F, X₁₄ is P or Q, X₁₅ is L, H, R, F, P
or C, X₁₆ is A, V or I, X₁₇ is G, S, D, N, I or V,
25 X₁₈ is A, V or E, X₁₉ is P, S or T, X₂₀ is L, P, H
or R, X₂₁ is P or L, X₂₂ is T or I, X₂₃ is L, P or
H, X₂₄ is P or L, X₂₅ is M or T, X₂₆ is A, V or P,
X₂₇ is M, I or T, X₂₈ is A or V, X₂₉ is W, A, L or
V, X₃₀ is G or D, X₃₁ is Q, L or R, X₃₂ is H, L, P
30 or R, X₃₃ is V, A, E, K or T, X₃₄ is A or V, X₃₅ is
L, R, H or P, X₃₆ is V, A, I or G, X₃₇ is P or L,
X₃₈ is R, Q, L, M, T, E or P, X₃₉ is G or D, X₄₀ is
V, A or G, X₄₁ is R or H, X₄₂ is V or A, X₄₃ is I or
T, X₄₄ is R, G or K, X₄₅ is I or T, X₄₆ is P or L,
35 X₄₇ is S or L, X₄₈ is H or R, X₄₉ is A or V, X₅₀ is
A, V or G, X₅₁ is S or L, X₅₂ is T or I, X₅₃ is T or

I, X₅₄ is F, Y or S, X₅₅ is S or L and X₅₆ is A, V, G or H.

3. The polypeptide F' as claimed in claim 2,
5 characterized in that it is chosen from the
polypeptides of sequences SEQ ID No.2 to SEQ ID
No.150, preferably the sequence SEQ ID No.2.

4. The polypeptide F' as claimed in claim 1,
10 characterized in that it has the sequence SEQ ID
No.151 below:

X₁WVCX₂X₃X₄X₅X₅₇LX₅₈X₅₉X₆₀X₆X₆₁X₇AX₉X₁₀X₁₁X₁₂X₆₂X₁₃PX₆₃X₁₅X₁₆
X₁₇X₆₄X₆₅X₁₈X₆₆PGX₂₀SX₂₁GTX₂₃GX₂₄X₆₇X₂₅X₂₆X₂₇RAX₂₉X₃₀X₆₈X₃₁X₆₉
GX₇₀CX₃₂X₇₁X₃₃X₃₄X₃₅X₇₂X₇₃X₃₆GX₇₄X₃₇X₃₈TPGX₄₀X₇₅X₄₁AX₄₃X₇₆X₇₇
15 X₄₄SSX₄₅X₄₆X₄₇X₄₈X₄₉X₅₀ X₅₁X₇₈X₅₂SWGX₅₃X₅₄RSX₇₉X₅₆,

in which

X₁ is D, N, S, Y or G, X₂ is A or V, X₃ is R, Q, K or L, X₄ is R, Y, C, F, H, L or P, X₅ is V, A or T, X₆ is H, R or Q, X₇ is L or P, X₉ is D, V, N, R or T, X₁₀ is G, D or S, X₁₁ is D, V, A, G or E, X₁₂ is S, N or T, X₁₃ is S, P or F, X₁₅ is R, H or L, X₁₆ is V or A, X₁₇ is G, R, E, H or V, X₁₈ is A or D, X₂₀ is L, P or R, X₂₁ is P or L, X₂₃ is L or P, X₂₄ is P or L, X₂₅ is M or T, X₂₆ is V, G, A or E, X₂₇ is M, T or I, X₂₉ is A or V, X₃₀ is G, V or D, X₃₁ is Q or R, X₃₂ is P or L, X₃₃ is A or V, X₃₄ is A or V, X₃₅ is P or L, X₃₆ is L, A, V, R, I or P, X₃₇ is Q, K or P, X₃₈ is M or T, X₄₀ is V, G, D, E or A, X₄₁ is P, H or L, X₄₃ is I or T, X₄₄ is R or K, X₄₅ is I or T, X₄₆ is P or L, X₄₇ is S or L, X₄₈ is R or H, X₄₉ is A or V, X₅₀ is D, G, A or V, X₅₁ is S or L, X₅₂ is T, I or A, X₅₃ is T or I, X₅₄ is F or S, X₅₆ is A or V, X₅₇ is K, R or N, X₅₈ is L, P or Q, X₅₉ is S or N, X₆₀ is G or D, X₆₁ is S or N, X₆₂ is L

or P, X₆₃ is R or G, X₆₄ is A, P or L, X₆₅ is R, K, E or T, X₆₆ is G or D, X₆₇ is S, Y or F, X₆₈ is G or W, X₆₉ is G or D, X₇₀ is S or F, X₇₁ is P, H, R or L, X₇₂ is V, A, D or G, X₇₃ is H, L, P, Q or R, X₇₄ is A or P, X₇₅ is G or D, X₇₆ is W or L, X₇₇ is V or A, X₇₈ is P or L and X₇₉ is S, L or Q.

5. The polypeptide F' as claimed in claim 4, characterized in that it is chosen from the polypeptides of sequence SEQ ID No.152 to SEQ ID No.176, preferably the sequence SEQ ID No.152.
10. A nucleotide sequence encoding any one of the polypeptides F' as defined in any one of claims 1 to 5.
15. An epitope derived from the protein sequence of the polypeptide F' as defined in claim 1, characterized in that it induces an immune response against the hepatitis C virus and consists of 9 amino acids located between positions 40 and 48 of the hepatitis C virus polyprotein.
20. 25. 8. The epitope as claimed in claim 7, characterized in that it has one of the sequences SEQ ID No.177 to SEQ ID No.235, preferably the sequence SEQ ID No.177.
30. 35. 9. An epitope derived from the protein sequence of the polypeptide F' as defined in claim 1, characterized in that it induces an immune response against the hepatitis C virus and consists of 9 amino acids located between positions 43 and 51 of the hepatitis C virus polyprotein.
10. The epitope as claimed in claim 9, characterized

in that it has one of the sequences SEQ ID No.236 to SEQ ID No.283, preferably the sequence SEQ ID No.236.

- 5 11. An epitope derived from the protein sequence of the polypeptide F' as defined in claim 1, characterized in that it induces an immune response against the hepatitis C virus and consists of 9 amino acids located between
10 positions 50 and 58 of the hepatitis C virus polyprotein.
12. The epitope as claimed in claim 11, characterized in that it has one of the sequences SEQ ID No.284 to SEQ ID No.358, preferably the sequence SEQ ID No.284.
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13. An epitope derived from the protein sequence of the polypeptide F' as defined in claim 1, characterized in that it induces an immune response against the hepatitis C virus and consists of 9 amino acids located between positions 73 and 81 of the hepatitis C virus polyprotein.
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- 25 14. The epitope as claimed in claim 13, characterized in that it has one of the sequences SEQ ID No.359 to SEQ ID No.434, preferably the sequence SEQ ID No.359.
- 30 15. A nucleotide sequence encoding any one of the epitopes as defined in claims 7 to 14.
- 35 16. An expression vector, characterized in that it comprises a nucleotide sequence as claimed in either of claims 6 and 15, and also the means required for its expression.
17. An expression vector, characterized in that it

comprises at least two nucleotide sequences as claimed in claim 15, and also the means required for its expression.

- 5 18. A microorganism or a host cell transformed with at least one expression vector as defined in claims 16 and 17.
- 10 19. An antibody directed against one of the polypeptides F' as defined in claims 1 to 5 or against one of the epitopes as defined in claims 7 to 14.
- 15 20. The use of one of the polypeptides F' as defined in claims 1 to 5 or of one of the epitopes as defined in claims 7 to 14, for preparing a drug intended to inhibit, prevent or treat an infection caused by the hepatitis C virus in an animal, preferably a human.
- 20 21. A pharmaceutical composition, in particular a vaccine, comprising, by way of active substance, at least one of the polypeptides F' as defined in claims 1 to 5, at least one of the epitopes as defined in claims 7 to 14, or else at least one of the nucleotide sequences as defined in claims 6 or 15 placed under the control of elements required for constitutive and/or inducible expression of said polypeptides F' or epitopes, or else at least one antibody as defined in claim 19, in combination with a pharmaceutically appropriate vehicle.
- 25 30 35 22. A diagnostic composition for detecting and/or quantifying the hepatitis C virus, comprising at least one of the polypeptides F' as defined in claims 1 to 5, at least one of the nucleotide sequences as defined in claim 6, or else at least one antibody as defined in claim 19.

23. A method for detecting and/or quantifying the hepatitis C virus in a biological sample taken from an individual who may be infected with said virus, such as plasma, serum or tissue, characterized in that it comprises the steps consisting in:

- bringing said biological sample into contact with the antibodies as claimed in claim 19 under conditions that allow the formation of a complex between the virus and the antibody, and

- detecting and/or quantifying the formation of said complex by any appropriate means.

15 24. The use of the composition as claimed in claim 22, for the *in vitro* diagnosis of the hepatitis C virus in a biological sample or specimen.